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Attorney Docket No. 1034345-000086

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of

Nathan S. Lewis *et al.*

Application No.: 09/409,644

Filed: October 1, 1999

For: CONDUCTIVE ORGANIC SENSORS, ARRAYS AND METHODS OF USE

Group Art Unit: 1743

Examiner: Arlen Soderquist

Appeal No.: 1

Certificate of Mailing

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 C.F.R. §1.10, Express Mail Label No. EV 892 880 367 US, on October 22, 2007 as is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

By: K A Cabello
Kim A. Cabello

TRANSMITTAL LETTER

Mail Stop APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Enclosed herewith for filing in the above-identified matter are the following items:

1. Supplemental Reply Brief; and

2. Return Receipt Postcard.

A Request for Oral Hearing was filed on September 22, 2005 along with the appropriate fee.

No fee is believed to be due in connection with the attached paper. However, in the event a fee is required please charge, or to credit any overpayment to, Deposit Account No. 02-4800. This paper is submitted in duplicate.

Respectfully Submitted,

BUCHANAN INGERSOLL & ROONEY LLP

By: _____

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By: _____
Kim A. Cabello

SUPPLEMENTAL REPLY BRIEF

Mail Stop APPEAL BRIEF - PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This present Supplement Reply Brief is in response to the Supplemental Examiner's Answer of August 22, 2007.

No fee is believed to be due for consideration of this Supplemental Reply Brief. However, the Commissioner is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 02-4800.

(1) Real Parties in Interest

The Real Parties in Interest are as set forth previously and agreed to by the Examiner.

(2) Related Appeals and Interferences

There are no known related appeals or interferences.

(3) Status of Claims

The status of the claims is as set forth previously and agreed to by the Examiner.

(4) Status of Amendments

The status of amendments is as set forth previously and agreed to by the Examiner.

(5) Summary Claimed Subject Matter

The summary of claimed subject matter is as set forth previously and agreed to by the Examiner.

(6) Grounds of Rejection to be Reviewed on Appeal

The grounds of rejection are as set forth in the Supplemental Examiner's Answer.

(a) Withdrawn Rejections and References

The Examiner has withdrawn the rejection over the cited reference of de Lacy Costello.

The Examiner has withdrawn the rejection of claim 158 under 35 U.S.C. §112.

The Examiner has withdrawn the rejection of claims 98-110, 112-123, and 126-159 for obviousness-type double patenting.

The Examiner has withdrawn the Stetter reference from the combination of references used to support the Examiner's alleged obviousness rejection.

(b) Remaining Grounds of Rejection

The Examiner has alleged that claims 98-110, 112-113, 115, 117-123, 126-135, 137, 139-157 and 159 are unpatentable under 35 U.S.C. §103(a) over Gibson (WO 96/07901) in view of Barisci (Trends in Polymer Science, 1996) and Casella (Analytica Chimica Acta, 335:217-225, 1996), Thackeray *et al.* (J. Phys. Chem., 90(25):6674-6679, 1995), Yamato *et al.* (Synth. Met. 87:231-236, 1997), Naarmann (DE 3,728,452), Li (Materials Research Society Symposium Proceedings, 1995), Sakaguchi (JP 4-2958), or Wampler (Chem. Mater. 7(3):585-592, 1995).

The Examiner has alleged that claims 114, 116, 136, 138 and 158 are unpatentable under 35 U.S.C. §103(a) over Gibson (WO 96/07901) in view of Barisci (Trends in Polymer Science, 1996) and Casella (Analytica Chimica Acta, 335:217-

225, 1996), Thackeray *et al.* (J. Phys. Chem., 90(25):6674-6679, 1995), Yamato *et al.* (Synth. Met. 87:231-236, 1997), Naarmann (DE 3,728,452), Li (Materials Research Society Symposium Proceedings, 1995), Sakaguchi (JP 4-2958), or Wampler (Chem. Mater. 7(3):585-592, 1995) as applied to claims 108, 113, 115, 128, 135, 137 or 152 above, and further in view of Breheret (Colloq. Inst. Natl. Rech. Agron. 75:103-107, 1995), Mifsud (U.S. Patent No. 5,801,297; Mifsud I) and Mifsud (WO 95/08113; Mifsud II), Moy (Bioflavour 95(75):55-58, 1995) or Persaud (WO 86/01599).

(7) Arguments

Appellants respectfully submit that the drawings of Barisci are general structures with respect to the overall "different" systems. The Appellants also submit that the figures of Barisci do not depict Appellants' claimed invention comprising two different conductive materials, whether in stacked or random order. Figure 1, provided in the Appeal Brief mailed April 25, 2005, was provided to depict "alternating regions" as set forth in Appellants' claim 98 as well as the different measurement systems.

I. REJECTION OF CLAIMS 98-110, 112-113, 115, 117-123, 126-135, 137, 139-157 AND 159 OVER GIBSON IN VIEW OF BARISCI AND FURTHER IN VIEW OF CASELLA, THACKERAY *ET AL.*, YAMATO, NAARMANN, LI, SAKAGUCHI OR WAMPLER

Appellants respectfully maintain that the Examiner has not set forth a *prima facie* case of obviousness. The references when combined do not include all the elements of Appellants' claimed invention and result in a different function than what is described in the various references.

The invention provides sensor and sensor systems that advance technology by providing items of manufacture, devices and systems useful for sensing analytes in an environment through measuring a change in the resistance between two conductive leads separated by a sensing area of conductive polymeric material and an inorganic conductive material.

The Examiner alleges that one of skill in the art would arrive at Appellants' invention by combining polymer composites from amperometric sensors, which ideally do not change in resistance, with conductive polymeric sensors. However, the function of the sensing area of Appellants' invention derives from the ability of an analyte to absorb or imbibe and analyte thereby changing the physical property of the polymer material.

For example, at ambient temperature, most conducting polymers are in their glassy state, thus a low sorption and swelling level are expected and their contribution to the overall electrical resistance decrease is minor. For a pure conducting polymer, inserting analyte molecule into polymer matrix generically increases interchain distance, which affects the electron hopping between different polymer chains. In amperometric sensors, analyte molecules are not intended to be absorbed into the polymer chain because a consistent "electron hopping" distance is desirable for amperometric sensing.

In contrast, resistive sensors function to absorb and have interchain distance changed thereby providing a detectable change in the sensing material. Unlike Gibson, however, the sensing material of Appellants' invention also comprise inorganic conductive material. As taught by Sharma et al. (Sensors and Actuators B: Chemical, 85(1-2):131-136, Jun. 20, 2002), the inorganic molecules interact with analytes. These interactions result in a sensing area that does not behave according to Gibson and results in a function different than the amperometric sensors of Barisci and further in view of Casella, Thackeray *et al.*, Yamato, Naarmann, Li, Sakaguchi or Wampler.

One or more components of the sensing area in Appellants' invention, for example, can interact with an analyte to different extents, which results in various changes in overall conductivity. In some cases, for example, the analyte interacts with the inorganic conductive material, which is not present in Gibson. In another aspect, the analyte interacts with the conductive polymer of the composite resulting in increased distances for "electron hopping", an undesirable effect in amperometric sensors of.

Accordingly,

(1) Gibson does not teach or suggest inorganic conductive materials in a sensing area.

(2) Appellants' invention allows increased sensitivity due to the availability of the inorganic conductive material to interact with an analyte, in addition to a conductive material thereby providing a sensor with broader reactivity and sensing.

(3) Amperometric sensor are not intended to change conductivity as such a change would result in a sensor have undesirable "poisoning" and decreased sensitivity. Undesirable change would include a change in the interchain distance and "electron hopping" due to interaction of an analyte with a conductive polymer.

As the U.S. Supreme Court stated in *KSR International Co. v. Teleflex Inc. et al.*:

> For over a half century, the Court has held that a "***patent for a combination which only unites old elements with no change in their respective functions***...obviously withdraws what is already known into the filed of its monopoly and diminishes the resources available to skillful men."

U.S. Supreme Court No. 04-1350, Slip Op. at 11-12 (April 30, 2007) (emphasis added). As demonstrated below, the invention is not a mere combination of old elements but a combination that results in a system that functions in a different manner resulting in unexpected sensitivity to analytes compared to amperometric sensors and compared to resistometric sensor lacking an inorganic material. This type of advancement in the technology should be rewarded based upon the public policies of the Patent System.

The Examiner attempts to overcome the "respective functions" of the different systems by stating,

> Thus while <u>there are differences</u> in the measurement techniques, there are clear indications that the electrical properties measured by each technique are sensitive to the same/similar type of interactions with the environment. Thus, one of ordinary skill in the art would have recognized commonality between the properties of the conductive polymers and the ability to measure a change in the properties of the conductive polymers by the two measurements techniques. While the setup used to measure the properties may be different for the two measuring methods [the] fact that the interaction with the environment causes change in the electrical properties does not change.

(Page 21, lines 18-25, Supplemental Examiner's Answer).

Appellants respectfully submit that these "differences" are some of the reasons that lend to the non-obviousness of the invention. These "differences" in measurement techniques would not lead one of skill in the art to combine the teachings. One of skill in the art recognizes that amperometric sensor materials are selected because they are ideally inert. Because of the "differences" in the measurement techniques, which is related to the material compositions (i.e., a material that is non-reactive in amperometric systems), one would not look to combine the references teaching "inert" materials with reactive materials.

Teaching Away

Appellants submit that Breheret and Mifsud provide evidence of the teaching away of the two different systems. Breheret and Mifsud are not specific to any particular gases or polymer sensors. The Examiner wishes to disregard this teaching and apply the references only to the dependent claims teaching additional structures. These references are generally available to one of skill in the art; the teachings of Brehert and Mifsud are available to Appellants to demonstrate a lack of motivation to utilize polymer sensors and the Examiner cannot simply ignore the teachings as being irrelevant unless addressed to the dependent claims. Furthermore, Sestak (of record) teaches away (even after Appellants' invention date) from amperometric-electrochemical materials as they degrade due to oxidation.

Appellants are not attacking the references individually. Rather Appellants are merely describing the teachings of each reference individually in order to present the lack of motivation and missing elements when the references are combined. In addition, Appellants address specific references because they teach the "inert" characteristic of amperometric sensors and furthermore teach away from the use of polymer sensors. By addressing the list of references "generally" or from a high level, as suggested by the Examiner, the true teachings of the references are being overlooked or misconstrued. Appellants are demonstrating that the generalizations made in the obviousness rejection are not accurate and thus the references should not be construed as providing certain information when in fact they do not provide such information and/or teach away from such information.

In order to justify the combination of references proposed by the Examiner one of skill in the art would be required to discard teachings in the art indicating that (1) polymer sensors are not sensitive to analytes (see, *e.g.*, Breheret and Mifsud I

and II), (2) that polymer materials in amperometric-electrochemical sensors undergo degradation (see, *e.g.*, Sestak), and (3) that materials that are selected in amperometric sensors are useful because they do not change conductivity. Furthermore, in order to arrive at the alleged motivation to combine the references one would have to modify the materials and systems in the secondary references such that they no longer function for their intended purpose (*i.e.*, that the material in the electrochemical sensors change in resistance). One of skill in the art would be required to discard the fundamental different operating conditions and principles of materials used in amperometric-electrochemical systems, namely that the materials be inert/invisible to the system (*i.e.*, they do not change their ability to conduct ions or electrons), to arrive at Appellants' invention which necessitates that the materials undergo a change in conductivity when contacted with an analyte.

II. REJECTION OF CLAIMS 114, 116, 136, 138 and 158 OVER GIBSON IN VIEW OF BARISCI AND FURTHER IN VIEW OF CASELLA, THACKERAY *ET AL.*, YAMATO, NAARMANN, LI, SAKAGUCHI OR WAMPLER

The Arguments above are reinterated and incorporated with respect to the rejections of claim 114, 116, 136, 138 and 158.

For at least the foregoing reasons a prima facie case of obviousness has not been made.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY LLP

Date October 22, 2007

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